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REMARKS

Claims 1 and 7-14 are all the claims presently being examined in this application. Claim 1 has been amended to more particularly define the claimed invention. Claims 2-6 have been canceled. Claims 7-14 have been added to claim additional features of the claimed invention.

It is noted that the amendments are made only to more particularly define the invention and not for distinguishing the invention over the prior art, for narrowing the scope of the claims, or for any reason related to a statutory requirement for patentability. It is further noted that, notwithstanding any claim amendments made herein, Applicants' intent is to encompass equivalents of all claim elements, even if amended herein or later during prosecution.

Claims 1, 2 and 4 stand rejected under 35 U.S.C. §102(e) as being anticipated by Iida et al., U.S. Pat. No. 6,497,301. Claims 1 and 3 stand rejected under 35 U.S.C. §102(e) as being anticipated by Katayama et al., U.S. Pat. App. No. 2003/0036837. Claims 1, 5 and 6 stand rejected under 35 U.S.C. §102(b) as being anticipated by Takasaki et al., U.S. Pat. No. 5,631,829.

These rejections are respectfully traversed in view of the following discussion.

I. THE CLAIMED INVENTION

The amended claimed invention (as defined, for example, by independent claim 1) is directed to a driving force distribution control device for a vehicle for controlling engaging force of a coupling mechanism so as to change transmission torque, thereby distributing driving force. The device includes means for continuously changing a torque limiter which limits engaging force of the coupling mechanism, from a limiter value in an ordinary control state according to a driving state, to a limiter value in a specific control state at the time of mounting nonstandard-diameter tires. Additionally, the device includes means for controlling engaging force of the coupling mechanism so as to be kept below the limiter value of the torque limiter in every control state, and means for setting amount-of-change of the torque limiter per time increment at transition from the ordinary control state to the specific control state and amount of change of the torque limiter per time increment per time increment at recovery from the specific control state to the ordinary control state so that the latter may be relatively larger than the former.

Conventionally, driving force transmission systems for four-wheel-drive vehicles have

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coupling mechanisms made up of a multiple disc clutch disposed within a transfer case, and controlling engaging torque of this coupling mechanism continuously controls distribution of driving force toward the rear wheel side. However, the conventional torque limiter fixes the transmission torque at a constant value, so in the event of mounting nonstandard-diameter tires or in the event of performing specific control in a state wherein oil temperature of the differential (especially the rear differential) rises abnormally, deterioration of driving performance is brought about, and also in the event of transition from an ordinary control state to a specific control state or in the event of switching of the control state at recovery from the specific control state to the ordinary control state, the engaging torque is drastically changed, thereby causing problems such as deterioration for driving stability and driving performance, (Application at page 1, line 15 to page 2, line 20).

The claimed invention, on the other hand, includes means for continuously changing a torque limiter which limits engaging force of said coupling mechanism, from a limiter value in an ordinary control state according to a driving state, to a limiter value in a specific control state (e.g., at the time of mounting nonstandard-diameter tires, as recited in claim 1). This allows the present invention to help avoid excessive change of torque at transition between the ordinary control state and the specific control state, and reduce adverse effects on driving stability and driving performance under the specific control state (Application at page 15, lines 1-6).

II. THE ALLEGED PRIOR ART REFERENCES

A. Iida, et al.

The Examiner alleges that Iida teaches the invention of claim 1. Applicant submits, however, that Iida does not teach or suggest each and every element of the claimed invention.

Iida teaches a starting time limit vehicle speed which preferentially permits a torque distribution to front and rear wheels at the time of starting of a vehicle is switched in accordance with a degree of a wheel diameter difference. When the vehicle runs with different-diameter tires mounted thereon, a front/rear wheel distribution torque caused by a front/rear wheel rotation speed difference owing to the different-diameter tires is limited by switching a torque gain

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depending on a degree of a diameter difference.

Specifically, Iida does not teach or suggest "*means for continuously changing a torque limiter which limits engaging force of said coupling mechanism, from a limiter value in an ordinary control state according to a driving state, to a limiter value in a specific control state at the time of mounting nonstandard-diameter tires*", as recited in claim 1. As noted above, this allows the present invention to help avoid excessive change of torque at transition between the ordinary control state and the specific control state, and reduce adverse effects on driving stability and driving performance under the specific control state (Application at page 15, lines 1-6).

Indeed, Applicant would point out that in Iida, when mounting nonstandard-diameter tires, the larger the nonstandard-diameter tire is, the smaller the value the limiting torque is set to. However, in Iida it is limited only to the starting time to apply a limiting torque which has been made smaller than that in the ordinary control state when mounting nonstandard-diameter tires. That is, Iida neither discloses nor suggests the relation of the torque limitation with such nonstandard-diameter tires and the torque limitation in the ordinary control state.

Hence, it is difficult in Iida et al at transition from the ordinary control state to the specific control state or at recovery from the specific control state to the ordinary control state to avoid abrupt change of engaging torque and prevent excessive rising in oil temperature of respective parts or lowering of performance of respective parts so as to suppress that the stability in driving or the performance in running deteriorates as in the present invention.

Therefore, Applicant respectfully submits that the Iida reference fails to teach or suggest each and every element of the claimed invention. Therefore, the Examiner is respectfully requested to withdraw this rejection.

B. Katayama et al.

The Examiner alleges that Katayama et al. (Katayama) teaches the invention of claim 1. Applicant submits, however, that Katayama does not teach or suggest each and every element of the claimed invention.

Katayama teaches an apparatus and method for a four-wheel-drive vehicle, wherein a

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command is outputted to a front and rear wheel driving force distribution control system to reduce a clutch engagement force of a clutch such as a frictional clutch when a subtraction value of a detected value of a clutch transmission torque from that of the clutch input torque is smaller than a predetermined value in detected wheel velocities of both left and right road wheels of the vehicle are substantially equal to each other.

However, Applicant submits that Katayama does not teach or suggest "*means for continuously changing a torque limiter which limits engaging force of said coupling mechanism, from a limiter value in an ordinary control state according to a driving state, to a limiter value in a specific control state at the time of mounting nonstandard-diameter tires*", as recited in claim 1.

Indeed, Applicant would point out that Katayama relates to a friction clutch of a four-wheeled vehicle. It is noted in Katayama that, in a direct-coupled four-wheeled drive state in which no slip of the friction clutch is caused, or in a four-wheeled drive state in which little slip of the friction clutch is caused, and in case where wheel speeds of the right wheel and the left wheel are substantially the same, the clutch engaging force for the friction clutch is reduced, thereby to prevent synchronization of the wheel speeds of the four wheels and improve the assumed accuracy of the vehicle body speed based on the wheel speeds in the TCS control.

The Examiner asserts that Katayama discloses means for continuously changing a torque limiter to a limiter value in a specific control state for protecting a driving force transmission system (velocity difference between the front and rear wheels (e.g., see Kakayama at [0032])). However, the Examiner is clearly incorrect.

That is, the term "torque limitation" in Katayama may be considered as the torque reducing control in the ordinary control state as recited in the present application. That is, the "torque limitation" in Katayama differs from "*continuously changing a torque limiter from a limiter value in an ordinary control state to a limiter value in a specific control state*" as in the claimed invention.

Further, Applicant notes that in Katayama, a rise in a clutch temperature (e.g., oil temperature as referred to by the Examiner) is detected, but any torque reducing control is not performed in case where the clutch temperature is higher than a threshold value, which does not

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fall under the specific control state as pointed out by the Examiner.

Therefore, Applicant respectfully submits that the Katayama reference fails to teach or suggest each and every element of the claimed invention. Therefore, the Examiner is respectfully requested to withdraw this rejection.

C. Takasaki et al.

The Examiner alleges that Takasaki et al. (Takasaki) teaches the invention of claim 1. Applicant submits, however, that Takasaki does not teach or suggest each and every element of the claimed invention.

Takasaki teaches an automobile driving-torque distribution control system for controlling a torque distribution between front and rear road wheels, comprising a torque-distribution adjustment mechanism responsive to a control signal for adjusting a distribution of driving torque between the front and rear wheels, sensors for detecting front and rear wheel speeds, and a controller for producing the control signals based on the difference between the front and rear wheel speeds. The controller includes a correction circuit for correcting the control signal value, to keep the control signal value at a designated torque-distribution of limiting value when a satisfying both a first condition in which a wheel-speed difference decreases to a value below a predetermined threshold, and a second condition in which an elapsed time calculated from the time when the first condition has been satisfied, is less than a predetermined time period.

However, Applicant submits that Takasaki does not teach or suggest "*means for continuously changing a torque limiter which limits engaging force of said coupling mechanism, from a limiter value in an ordinary control state according to a driving state, to a limiter value in a specific control state at the time of mounting nonstandard-diameter tires*", as recited in claim 1.

Indeed, Applicant would point out that Takasaki is intended to prevent an unpleasant feeling to the people in the vehicle due to an abrupt increase in the rotation of the sub-drive wheels which had been stopped due to not having been put in the four-wheel drive state, such as in a situation in which the main drive wheels rotate idly and the sub-drive wheels do not rotate but remain stopped at the time of mounting nonstandard-diameter tires or running on snow-

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covered roads or escaping from muddy roads or the like.

That is, Takasaki merely forcibly puts the vehicle in a two-wheel drive mode when the main drive wheels rotates idly and the sub-drive wheels do not rotate but remain stopped even if the four-wheel drive mode is selected. Thus, since the claimed invention and Takasaki are fundamentally different in purpose, Takasaki clearly does not by any means teach or suggest "*continuously changing a torque limiter from a limiter value in an ordinary control state to a limiter value in a specific control state*" as in the claimed invention.

Hence, it is not possible to expect from Takasaki to obtain such unique effects as provided in the claimed invention (e.g., to inhibit an abrupt variance in the engaging torque at the switching time of control states at transition from the ordinary control state to the specific control state or at recovery from the specific control state to the ordinary control state so that the stability in driving or the performance in running deteriorates).

The Examiner also asserts that Takasaki discloses that amount of change of the torque limiter rate per time increment at recovery from the specific control state to the ordinary control state are set to mutually different values or to approximately equal values according to the specific control state. However, Applicant respectfully submits that the Examiner is incorrect in his interpretation. That is, Takasaki sets forth nothing but the rotational difference between the main drive wheels and the sub-drive wheels.

Therefore, Applicant respectfully submits that the Takasaki reference fails to teach or suggest each and every element of the claimed invention. Therefore, the Examiner is respectfully requested to withdraw this rejection

III. FORMAL MATTERS AND CONCLUSION

In view of the foregoing, Applicant submits that claims 1 and 7-14, all the claims presently pending in the application, are patentably distinct over the prior art of record and are in condition for allowance. The Examiner is respectfully requested to pass the above application to issue at the earliest possible time.

Should the Examiner find the application to be other than in condition for allowance, the Examiner is requested to contact the undersigned at the local telephone number listed below to

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discuss any other changes deemed necessary in a telephonic or personal interview.

The Commissioner is hereby authorized to charge any deficiency in fees or to credit any overpayment in fees to Attorney's Deposit Account No. 50-0481.

Date:

12/21/05

Respectfully Submitted,



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CERTIFICATE OF FACSIMILE TRANSMISSION

I hereby certify that the foregoing was filed by facsimile with the United States Patent and Trademark Office, Examiner BEHNCKE, Christine M., Group Art Unit # 3661 at fax number 571-273-8300 this 22nd day of December, 2005.



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